

Proposed Perchlorate Treatment Program

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Working Group
Main San Gabriel Basin Watermaster
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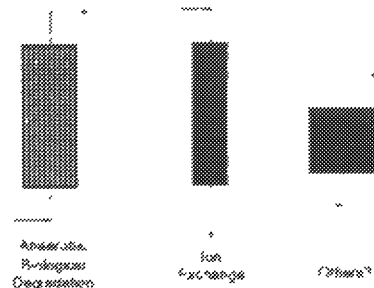
Outline

- Introduction
- Promising perchlorate treatment options
- Interested party proposals
- Schedule and budget
- Recommendations

Introduction

- Perchlorate discovered in San Gabriel Basin
- Action level set at 18 ug/L
- BIOU implementation delayed
- Treatment solution needed
- Perchlorate resistant to most conventional and advanced treatment processes
- All options assume Aerojet demonstration of biological technology in parallel

Promising Perchlorate Treatment Options



Interested Party Proposals

- Presentations on November 24, 1997
 - ▼ Boyle Engineering
 - ▼ Calgon Carbon Advanced Separation Technologies
- Letter proposal from Montgomery Watson

Boyle Engineering

- "Black Box" technology
- Reported high removal efficiencies
- No impact on other water quality parameters
- Monthly rejuvenation
- Total Annualized Cost Estimate
 - ▼ 1 mgd \$250 - \$300/AF
 - ▼ 10 mgd \$200 - \$300/AF

Boyle Engineering (cont.)

- Require non-disclosure agreement with one representative
- Letter dated December 2, 1997
 - ▼ Still interested
 - ▼ Now in discussions with U.S. Filter
 - ▼ Conducting additional tests
 - ▼ They will get back to us in the future

Ion Separator (ISEP) Principles



Calgon/Advanced Separation Technologies (cont.)

- Waiting for a letter proposal
- Funding needs about \$50,000
- Schedule uncertain / multiple pilot plants available for testing

Calgon/Advanced Separation Technologies

- Ion exchange technology
- Unique application using 20 - 30 ion exchange beds where processes are occurring simultaneously
- Theoretical advantages for waste minimization (1.3% versus 2-4%)
- Bench-scale testing underway for another client

ISEP Applications for Nitrate Removal

Wisconsin City Chooses
The ISEP Nitrate Removal System



Montgomery Watson Letter Proposal

- Original proposal
- Revised proposal dated 10/27/97 focused on pilot-scale only
- Revised proposal dated December 2, 1997
 - ▼ Bench and pilot studies
 - ▼ Waste stream treatment evaluation
 - ▼ Cost estimate

Montgomery Watson Letter Proposal (cont.)

- Task 1: Prepare experimental plan
- Task 2: Convene project workshop
- Task 3: Conduct bench-scale testing
- Task 4: Conduct pilot-scale testing
- Task 5: Prepare technical memorandum

Montgomery Watson Letter Proposal (cont.)

- Schedule: 6 months total time
- Budget: \$150,000
- Ready to implement program immediately

Schedule and Budget

- By July 1998, should have MW and Calgon projects results available
- Boyle schedule uncertain
- Budget
 - ▼ Montgomery Watson: \$150,000
 - ▼ Calgon: \$50,000
 - ▼ Boyle: Uncertain

Recommendations

- Hire Montgomery Watson immediately to perform traditional ion exchange bench- and pilot-scale study--\$150,000
- If Calgon proposal is acceptable, proceed with funding a portion of their study--\$50,000
- Wait for Boyle Engineers and U.S. Filter to sort out their approach and decide later on partial funding of their work.